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The Robbins Method of Preserving Wood.

Inventors have tried for many years to find a cheap and simple method to preserve wood from decay, where it is exposed to the elements. The efforts in this direction have generally had in view the principle of impregnating wood with the various metallic salts in solution, and the general term of Barnettizing has been applied to it from the name of one of the prominent inventors in this line.

None of these processes have stood the test of time and experience, for reasons quite obvious to the close observer or the chemist. The action of the air and moisture has proven too much for all these *pseudo* antiseptics, combined as they must be with the water of solution, and more or less of the sap of the wood, both tending to produce fermentation and decay in a longer or shorter period.

It has been left to Mr. Louis S. Robbins, of New York city, to find and apply a positive antisceptic or preservation of wood, in a manner peculiarly simple and complete, which will commend itself to the most casual observer, or the most critical physicist.

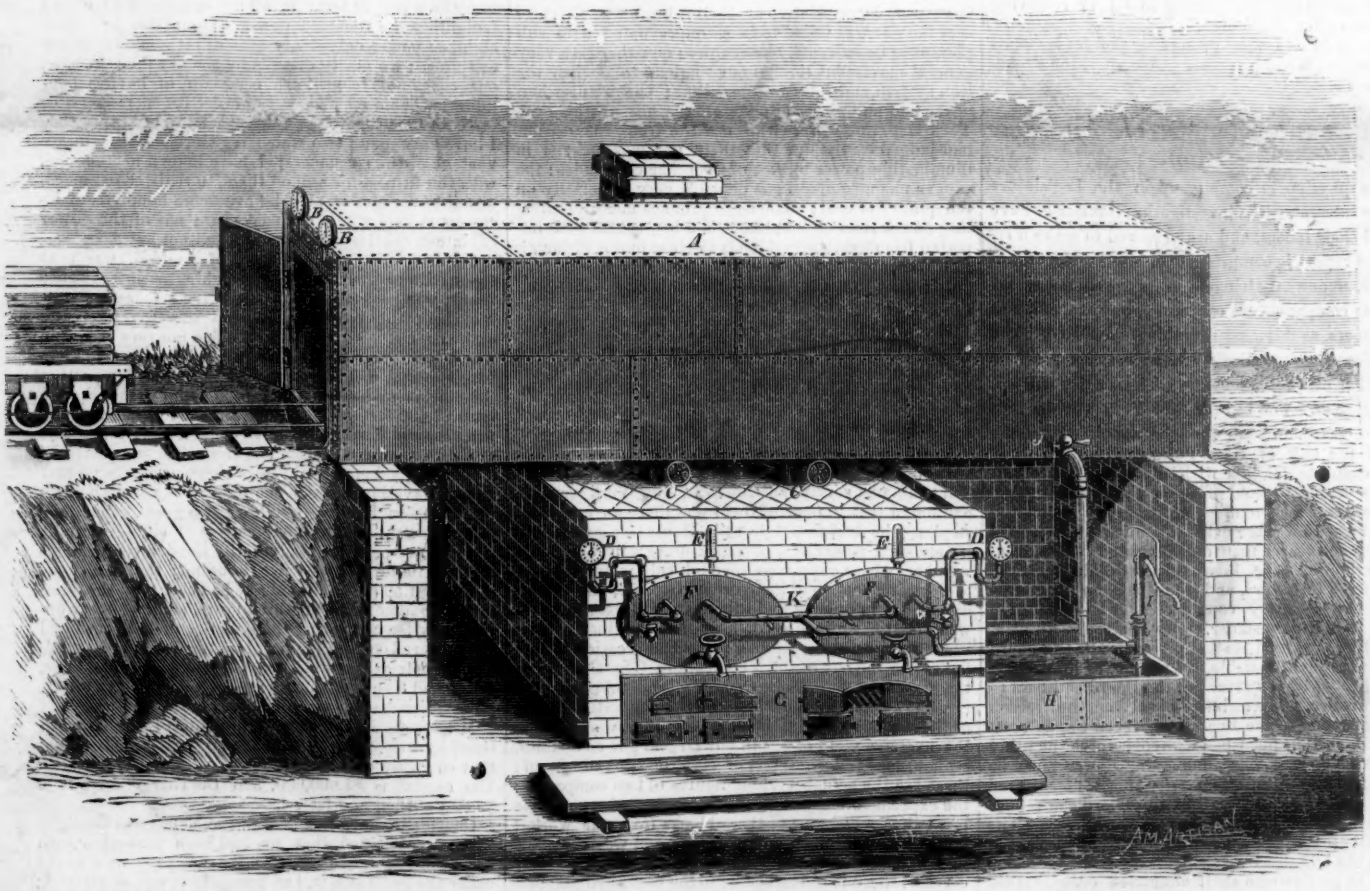
The method, as patented and practised by the inventor, consists simply in placing wood in a closed chamber of proper dimensions, which is connected with a boiler or retort containing coal-tar, which, upon the application of heat evolves vapors, which pass into the chamber and impregnate the wood under high temperature, and if necessary a high pressure.

We herewith give a description of the process in the words of the inventor.

"At from 250 to 300 degrees of heat, the vapor of naphtha is generated, and passes out into the chamber containing the wood. This is not a preservative, but it is sufficiently hot to drive the air out of the chamber and expel the moisture from the wood. It also has the effect of coagulating the albumen, as the white of egg is coagulated, made tough and insoluble by heat

"The air driven out, the moisture expelled, the albumen coagulated, and the pores of the wood opened and expanded, the heat under the still is increased to from 360 to 400 degrees. At this temperature the vapor of creosote, or carbolic acid, is produced, and passes into the chamber, and thus the wood is subject to a second bath, and in an element so subtle that it is readily and thoroughly permeated. This creosote, or carbolic, is a powerful antiseptic, and will effectually prevent the fermentation or putrefaction of the albumen—or, in other words, will prevent dry rot. It cures the wood as a ham is cured by smoke—it tans it as a hide is tanned with tanic acid.

"But merely to drive out the moisture, coagulate the albumen, and supply the antiseptic (according to Dr. Ure), is not all that is necessary. The fiber must be protected. By increasing the heat under the still to



from 500 to 600 degrees, the vapors of the heavy tar oils are carried into the chamber. The wood is now subjected to a third bath in the vapors of oils; these condense in the wood, prime it thoroughly, and furnish the fibrous portion with complete protection against the moisture of the atmosphere.

"The wood, thus treated from six to twelve hours, is in this condition; it has been seasoned or cured, fully saturated with the preservative, and then thoroughly primed with oil. There having been as much put into as there was driven out of the wood, it does not shrink; and not shrinking, it cannot warp or check; and not having undergone any change of form in the treatment, is at once ready and fitted to be applied to the purpose intended.

"The structure of the improved apparatus will be understood from the following condensed description of the engraving:—A represents the chamber for containing the wood. B B are guages showing amount of pressure in wood chamber. F F are the boilers in which coal-tar, or other oleaginous substance, is placed. G represents the furnaces which supply the heat to the stills or boilers containing the coal-tar. D D are guages showing the amount of pressure in the stills or boilers, F F. E E, thermometers showing amount of heat employed in the vaporization of the oil. J is a stop-cock or vent, through which the condensed vapors are discharged into a receptacle marked H, from which the oil is again pumped into the boilers or stills, by a pump marked I. K represents the pipe for filling the stills with oil from the tank. C C, the pipes connecting the stills or boilers with the chambers containing the wood.

"It will be perceived from this cut that the wood chamber has square sides; when, however, for the sake of dispatch and thoroughness, it is desirable to make use of a greater amount of pressure, it would be well to have the chamber cylindrical in form.

"The discharge-pipe and receptacle for the condensed vapors should properly be in the rear; it would thus be removed from the fire, and be so located that the oil could be run back into the stills without the use of a pump. There is also, in the rear of each boiler, a manhole, that can be used for putting in oil or removing the residuum after distillation."

The patent on this wood-preserving process is owned by the National Wood-preserving Company, 163 Broadway, New York City.

Report of the Committee on the Gas Question.

The gas question is coming up in the Legislature with some interest. The investigating committee have completed their labors, and are prepared to make a report. The report is comprised in a law for the city of New York, somewhat stringent in its provisions as far as the gas companies are concerned, but protective of the consumers, as it is most desirable it should be. The cases of Brooklyn and Buffalo have not yet received the attention of the committee. These cities will yet be taken care of. The bill for New York provides that a Board of Gas Examiners shall be appointed by the Mayor of the city of New York, composed of three practical chemists, familiar with the manufacture and properties of gas, to hold office for three years. This Board shall appoint a number of inspectors to test the quality of gas and make daily examinations at certain test houses not nearer than one thousand yards from each gas house. The Board shall decide upon the quality of gas furnished, and if an inferior article is supplied the company cannot recover the amount of their bill from the consumer. Gas companies furnishing gas of less purity than that prescribed by the Board of Examiners shall be liable in a penalty of $100 a day, to be collected by a warrant of the Board and paid to the Comptroller. The right to appeal from the decision of the Inspectors to the Board is reserved to gas companies, who shall be furnished with copies of the monthly report of the clerk The illuminating power must be that of sixteen candles. The price must not exceed three dollars for 1,000 feet; but the Board can reduce the price if the gas is not of the proper quality. The bill abolishes the system of demanding a deposit, and charging the bills due by consumers in premises vacated by them to parties who shall afterward occupy those premises.

The salaries of the members of the Board of Gas Examiners is fixed at $5,000 a year. The expenses of the central laboratory and test houses and salaries shall be raised by the Supervisors, and are to be levied upon the gas companies. The taxpayers are not to be mulcted a single dollar in the matter. This may seem stringent upon the companies, but when we consider that they pay dividends from eighty to one hundred and twenty-five on their stock it is not too much to ask them to furnish those accommodations to the public as may insure them a good quality of gas for their money. They engage to do so, and they should be held to their contract.

The Gas Investigation.

The investigation before the Assembly Committee, made during the month of March in this city, we have collated and condensed so as to present to our readers all that is material in a scientific view, and also such information as may be interesting regarding the condition, working and management of the gas companies of this city and Brooklyn.

Prof. Wurtz, chemist, was first sworn. He testified that in his experience he had found that the further off from the works one goes, the weaker he finds the light; at the Metropolitan Gas Works the power of a burner is equal to sixteen candles, but as the distance from the works increased the power decreased; he was of opinion that hydrate of lime was the best agent for the purification of gas without diminishing its illuminating power; one company in this city uses oxide of iron, but all the large companies use lime: good gas, as he defined it, should produce no decided odor when burning; it should not give forth the odor of creosote; it should not burn green; the excessive use of water in purifying gas is apt to destroy its illuminating power; the English standard of gas is about fourteen candles; in this city it is from fourteen to eighteen; in Boston they pretend to have eighteen-candle gas, but the witness did not know personally; it is not yet known which purifying process is the most economical; the hydrate of lime can always be obtained in any quantity, and is always reliable; it abstracts the injurious substances from the gas much more reliably than any other agent now known; there is a larger proportion of sulphur in gas purified by the iron process; in the gas of the company using that process there was found to be forty-five grains of sulphur, whereas good gas should have no more than twelve; in all the large cities of England, at the time when the iron process was brought forward, the authorities were appealed to to introduce this so-called improvement; on examination it was found that lime produced so much stench as to be very offensive and injurious to health; the iron process was introduced by legislative authority, but under this process the gas was found to be so impregnated with sulphur as to be extremely unhealthy; now there is a very general movement throughout England to abolish the iron system and return to the lime; the witness had never had an opportunity to test the gas of the New York Gas Company, (who use the iron process,) but had judged by the eye that their gas was inferior in illuminatidg power to that of the other companies; the proper manufacture of gas depends very materially on the quality of coal; some coals produce more illuminating power than others; there is a bog cannel coal, imported from Scotland, which is the best in use, although the Westmoreland coal of Pennsylvania is also very good; the witness considered that this city was as well lighted as any city that he knew of.

Mr. Weed made a motion that Prof. Wurtz and two other chemists examine the gas and the works of the various companies in this city and Brooklyn, and report as early as practicable to the committee on the illuminating power of those gases. Prof. Wurtz desired to know how long a time would be allowed. The Committee finally limited him to two weeks.

Prof. Charles F. Chandler was next examined. He had examined several specimens of New York gas, and had found that in none of them was there an excess of sulphur; he had found that the Manhattan gas had an illuminating power of fourteen candles; in very cold weather, where gas passes through cold mains, it is apt to deposit a portion of its hydro-carbon oils, and is thus diminished in quality and illuminating power; in warm weather it absorbs these deposite, and thus increases its illuminating power; he had never had occasion to find fault with the gas of the Metropolitan Gas Company; the gas of the New York Company is also of good quality, but he could not decide on the comparative merits of the various gases without a scientific examination; the average yield of gas in our largest gas companies, is about four and a half feet of gas to one pound of coal; these are the actual working figures of two companies; the experiments above alluded to were made some time last fall, at a distance of three blocks from the works; it was a mere accidental experiment and was not made with sufficient care to justify him that it was absolutely correct; there is difference as to the best purifying process: the general belief is that the dry lime process is the best, although it gives rise to odors which are extremely unhealthy; the iron process, while perhaps not as perfect, certainly is much more healthy; the iron process, properly applied, does reduce the illuminating power.

Mr. J. M. Long, Superintendent of the Harlem Gas Company, was the next witness—The company, he said, were in receipt of a few complaints as to the quality and quantity of the gas; the illuminating power of the Harlem gas he claimed to be equal to eighteen candles; he owned no stock in the company, being merely the Superintendent; the complaints generally arose as to the amount of bills, but these things are generally arranged without much delay; the manner in which the company ascertains whether its agents are honest is to send out men to examine all cases of complaint; there had never, to his knowledge, occurred a case in which an agent of the company had made out a bill by the average system, or without examining the meters; in the disarrangements to which meters are liable they show results quite as adverse to the company's interests as to those of consumers; the company loses as much as it gains by the variations of meters.

F. H. N. Newcombe, a shareholder in the New York Gas Company, was the next witness. He owned ten shares, on which he received dividends amounting to fifty per cent. per annum; this dividend was declared in 1868, but it has been as high before, and once it ran up to a larger amount; could not say exactly how much the company had increased its stock lately. He continued: I became a stockholder in 1845; during this period the dividends have ranged from nine to fifty per cent. per annum; ten per cent. of this latter dividend is the regular semi-annual dividend of five per cent.; the balance I was paid by the check of the company inclosed in a note; this dividend was not advertised; I would not like to sell my stock; I have not heard of any of the stock being sold for many years; the capital stock is now $1,000,000: the additional forty per cent is not exactly a dividend—it is an "extra division;" I paid $114 per share in 1845 for eight shares, and when the capital stock was increased I received two additional shares, (called "watered stock;") on these shares I have received fifty per cent. as well as on the others; I think I received fifty per cent. of dividends in 1867; am not certain.

Q.—Do you feel satisfied with these dividends? A.—Yes, sir; moneyed men are hard to satisfy, but I feel very well satisfied with my stock.

John Balmore, engineer of the Harlem Gaslight Company, testified: I have held my present position ten years; I am familiar with the manufacture of gas; the gas of our company average from eighteen to twenty candle in illuminating power; I make the photometrical examinations myself; I do not think the gas ever goes below the power I have named; it takes half an hour to make a proper test; in all my examinations I have found that the standard power of our gas has been eighteen power only—only once did it go down as low as sixteen; we purify our gas by the dry-lime process; our consumers sometimes complain of having poor lights; when a meter is out of order it generally registered less gas than passed through it; in my experience I have only found two which registered to the disadvantage of the consumers; I have known new meters, with the Inspector's seal on them, to register too much, or fail to register at all; I have found hundreds of incorrect meters within the past year; gas of the power of sixteen candles would be fair, but not extra.

Joshua Kidd, gas engineer, of London, was next sworn: He had been in the gas-making business twenty years; was perfectly familiar with the business in all its branches; the power in London was from twelve to eighteen candles; there is an office in every parish in which tests are made; each parish has a certain number of lamps, and it is especially for these lamps that the officers make the test; each lamp is supposed to burn 22,000 feet per year, and the cost is £5 sterling per year; in England, where coal is £1 per ton, gas is as cheap as where it costs not more than one quarter of a pound: good gas should be of eighteen candle power: gas, in traveling through the pipes, lost about one inch in a mile: in London they have two gases, cannel and common gas: the cannel gas was of eighteen candle power, and the other twelve; the London common gas cost a little less than $1 per thousand: the cannel gas is about $1.50 per thousand: he had charge of the lighting of London for about three years, and had every opportunity for comparing the quantity of gas consumed as registered on each lamp and by test meters: he made a photometrical examination at his office in Maiden-lane, and found the gas there to be of about twelve-candle power, sometimes less, sometimes more.

Mr. Joseph L. Halstean, a director of the Harlem Gas-Light Company, testified that in December last that company declared dividends of 11 and 12 per cent. The capital is $1,000,000, and the charge for gas is $3.50 per thousand feet.

Charles Roome, President of the Manhattan Gaslight Company, testified that he had been connected with the company for 32 years; the company now works under the general law, but formerly it was chartered; under the general law there is nothing which can be construed to restrict the company from making whatever charge it sees fit, or from increasing or decreasing the illuminating power of the gas at will. The capital of the company is $4,000,000—originally it was $500,000. The Legislature increased it to $1,000,000, afterward to $2,000,000; witness knew nothing as to the sale of stock during the past year; had signed certificates of transfer, but did not know the cost of stock; the company declared a dividend of five per cent in January last; did not know when the preceding dividends had been paid; the witness estimated that the company will, this year, use 25,000 tons of Westmoreland coal at an average price of $9 per ton; the illu-

minating power of the gas is tested every other day; it has not averaged below fourteen candles this year, and has gone up to sixteen candles; all the meters in use by the company are tested by the State Inspector; no meters not tested by this officer are purchased by the company; if a consumer doubts the correctness of his meter he can call on the company, and it is compelled by law to submit it to the State Inspector, providing the consumer is not satisfied with the examination given it by an agent of the company. The decision of the State Inspector is final. The gas is never cut off until due notice is given. The average dividends of the company for some years back have been 11 per cent., but some years they rose to 12½ per cent., no stockholders receiving any money excepting as above mentioned; from ordinary coal the company makes 10,000 cubic feet of gas per ton of 2,240 pounds; the charge to consumers is $3 per thousand feet; the other companies charge $3.50; the witness considered $3 a fair price for a thousand feet of gas. Last year, after the passage of an act forbidding gas companies charging for the rent of meters, the price of gas was raised, so that now the consumer pays the revenue tax in place of the company, as before. Under the old regulation the charge was $2.50 per thousand feet, and 25 cents for Government tax. The witness, in reply to a question by Mr. Bergen as to whether his company had any special privileges, replied: No; you could make as legitimate a company in twenty minutes; we have no special privileges; the company demands security from consumers, because if no security were required the losses would exceed the profits; the company has no right to refuse to supply any one applying, but there is no law which compels it to trust any person; the deposits as security are not used as available funds for the use of the company, but are held in trust; the company sometimes, in spite of the security system, loose money in bad debts.

The witness asserted positively and emphatically that the stories relating to an increase of bills in certain cases where no gas was burned was totally without foundation; that in his experience of over thirty years he had never known of a well-authenticated case of this kind; the company's agents never make estimates of bills unless the meter fails to register or is out of order; in cases where one person moves out of a house without paying his bill, and another moves in, the company never charges the arrearages to the new comer; when the company finds that the usual deposit as security is too small it is raised; poor gas registers much more rapidly than good gas; therefore, the poorer the gas the heavier the bill; there is no rule as to declaring dividends; during the past four years it has been 11 and 12 per cent.; no real estate has been purchased excepting that which has been absolutely necessary; there is no surplus fund; when the charter was given up certificates of indebtedness were given to stockholders at the rate of about 50 per cent. of the capital, on which 7 per cent. interest is paid: this payment is in addition to the regular dividend on the stock.

Mr. Joseph E. Sabbaton, engineer of the Manhattan Gas Light Company, testified that he had been in the employ of the company for 15 years, and has been an engineer for 20 years; the process for determining the illuminating power of gas is by an instrument called photometer, or by the comparison of the shadows of light; the strongest flame will cast the most dense shadow; the company supplies gas which is never lower than 19 candles; photometric examinations are made every other day; there is a record of these examinations kept by the company; the hydrate of lime is the agent used for purifying gas by the company; witness could assert without reservation, that the lime process was in every way superior to that in which the oxide of iron is used; he considered the lime process to be the best in use for purifying gas; and in addition to this, he was convinced that it was in every way more economical than the oxide of iron. The witness then entered into a scientific description of the process, and other matters connected with the use and manufacture of gas; it would be impossible to give the exact cost of producing gas, since it varies day by day—more so than nearly any other merchantable article; the gas of the Manhattan Company is as near perfection as can be made at its cost; in order to increase the illuminating power it would be necessary to materially increase the cost of production.

The Chairman—Mr. Sabbaton, it appears from the testimony that the price of coal, and of the production of gas, is constantly increasing, and yet that same testimony shows that the dividends have also increased; how do you account for that?

Witness—The company has increased its rates.

Mr. William Davidson, Gas Meter Inspector for the State of New York, testified that although he held the position of inspector, he was also engaged in business; he did not himself inspect meters very often, entrusting that duty to deputies; his salary was $2,500 per annum, out of which he pays his deputies; he was not a mechanic; he had never received a present from any gas company, nor were any of the deputies in the interest of the gas companies; several thousand meters were inspected in this city last year; when a meter is inspected the law authorized hin to charge for expenses for removing it, and no charge is allowed beyond that; the total receipts last year on account of inspections did not exceed $200; he had heard of no complaints as to the inspection of meters; his salary was raised by assessments on the various gas companies in the State; his mode of inspection was as follows: he made a receptacle which had capacity for a given number of feet of gas or air; the meter was connected with this receptacle; and the air or gas passed through it; if the index marked the exact number of feet known to be in the receptacle, the meter is correct; if the index does not register this amount, or fails to register at all, it is condemned and sent back to the company. Mr. Davidson having asserted that the variations of meters were mostly in favor of consumers, Mr. Mitchell asked him how it was that the complaints almost invariably came from consumers, the very parties benefited? In reply, he said that many persons complain, while actually being supplied with more gas than they pay for; in a late case of complaint against the Brooklyn Gas Company, he found on inspection that the meter registered three per cent. less gas than passed through it, thus giving the consumer the benefit of that amount; he was not interested in any city gas company, but held stock in a company within the limits of the State; no company could influence him, directly or indirectly; he was confident that his deputies performed their duties well and faithfully; he had never heard that an examination of a meter inspected by him had resulted in finding the meter incorrect; when his seal was placed on a meter it was correct unless tampered with; meters are numbered, and where a meter is condemned its number is registered; if a gas company knowingly uses a condemned meter, it commits a breach of the law.

M. L. Callender, editor of the GASLIGHT JOURNAL, testified that he was familiar with the manner in which gas was made and supplied consumers; the gas in Boston and St. Louis was better than in New York or any other city; in St. Louis they charged $4 for gas, and in Boston he thought $3 50; the gas in those cities, on an average, was equal to about eighteen candles. That of New York was equal to from fourteen to sixteen candles. It would be difficult for the Legislature to regulate the price of gas without interfering with the just profits of the company, because the prices of material and labor varied; if these things were taken into consideration it might be regulated; the fact that some of the New York companies charge $3 50 per 1,000 feet, and the Manhattan only $3, might be accounted for by different kinds of coal used by different companies; he thought the gas of the Manhattan Company was on an average as good as that of the other companies; the other companies could not supply gas at $3 as well as the Manhattan, because the price of gas varied on account of the amount manufactured by the several companies. The reason that gas companies charged the city $50 and $53 for gas for street lamps, instead of $28, as they did a few years ago, might be accounted for by the increased price of labor and material, but he could not say whether the increase was in proportion to this inecrease; he thought the street lamps gave a dim light for those having five-foot burners; the cost of coal in St. Louis is considerably more than here; the yield of gas there is less; they use the Pennsylvania coal there; careful management and experience would affect the price at which gas could be furnished by a gas company; better gas could be furnished for less cost. The witness gave a long explanation of the merits of the new hydrogen light.

John H. Adam, President of the New York Gas-light Company, again took the stand. He said he had been subpœnæd to bring the minute book, but had not done so, and would not bring any of the books of the Company; he declined to bring them on the ground that the Committee had no authority from the Legislature to examine into the private affairs of any gas company. The Legislature had a right to alter their charter or take it away, but could not compel the officers of any corporation to produce any of its papers before any committee. That question might as well be taken now and placed before the Supreme Court of Errors; he was educated as a lawyer, but had not recently practiced; as to a drag-net having been placed in the hands of the Committee to drag the private affairs of a gas company before it, he did not believe that the Assembly had done any such thing; he never would bring the books until ordered by the Court; if the Committee arrested him they took the risk of false imprisonment.

The Chairman of the Committee, Mr. Mitchell, read the authorization of the Committee to send for persons and papers.

Mr. Henry H. Anderson, counsel for Mr. Adam, stated that he was willing to answer any question that he could answer, but that he denied that the Committee was authorized to compel him to produce the books of the Company.

The witness proceeded to testify that the total moneys received by the Company in 1868, besides exchanges was about $2,000,000; about $1,950,000 or $1,850,000 was received from consumers; the net profits of the Company for the year ending Feb. 1, 1869, were $454,000, of which $30,000 were interest on securities, and $7,000 or $8,000 profits on sales; Mr. Newcomb owned probably eight shares of the Company; reaular dividends are declared May 1 and Nov. 1; extra dividends are declared; and Mr. Newcomb's statements in the main were correct; these dividends were such small profits that no gentleman present would be willing to continue business with such profits; the Company was not giving better gas this week than usual, and he had given no directions to that effect; the Company was erecting some new works, and was paying for them out of its profits; the Company had a surplus of $4,000,000 or $5,000,000 made by profits on the Company's stock at compound interest; he had purchased stock for $300 a share recently; he received about $8000 a year as President—about half enough to live on, but as much as a man couid rake and scrape as salary; no increase of the capital stock of the company had been asked because they were afraid if they went to Albany they would have to pay money for it; he knew that men were skinned alive at Albany by men who made a living out of legislation; he knew it as well as he knew that London existed; he had heard that the Manhattan company had obtained an increase of stock and he knew as well as he knew anything that that company had paid money for it; the aggregate expenditures in 1868 of the New York Gaslight company were about $1,550,000; from $600,000 to $1,000,000 was paid for coal that year; the rest of the expenditures were for the ordinary expenses of carrying on the business; the stockholders received during that year $500,000; he thought the company was doing $50,000 better than four years ago; the charges to consumers had been the same during the past three years—$3 50, of which the United States gets 25 cents; the prices were put up at the close of the war when the price of coal was $15, while now it was but $9; the assets of the company, consisting of $1,000,000, were principally in United States and other stocks. The surplus fund was not increased every year, according to the books, but its actual value might be increasing. The real estate and works were increasing in value. The regular semi-annual dividend was five per cent. It cost more to make gas to-day than any previous year since the war, excepting coal. The wages paid were twenty-ffve per cent. higher now; advances had been granted to the men to avoid strikes; the dividends had not averaged $500,000 a year for the last 25 years; this average had been kept up during the past four years. At the beginning of the year the company had 90,000 tons of coal on hand, bought at $4 50 and $5 a ton, which arose at once greatly in value; the company paid laborers $2 a day; he thought before the war they paid $1.40, and during the first year of the war, $1.70.

The committee then adjourned.

[To be continued.]

The Gas Nuisance.

The testimony taken in the various hearings before S. C. Hawley, in reference to the nuisance created at the works of the Metropolitan Gas-Light Company, foot of West Forty-second street, was presented.

Ex-Judge H. C. Vanvorst appeared on behalf of the Company. He spoke of the comparative merits of the dry-lime and of the oxide-of-iron process of purification. While admitting that the latter might cause less offensiveness at the works, he claimed that the former produced a gas of a better illuminating power. By the iron process the gas furnished to consumers contained more impurities, and upon combustion injurious effects were produced. He spoke in very decided terms of the willingness of the Company to do everything in their power to render their business unobjectionable to the public. Their object was to furnish the best gas and with as little offensiveness as possible.

Dr. Stone asked Prof. Chandler if the ventilating process, as employed by the Manhattan Gas Works, did not vitiate the atmosphere by absorbing oxygen, thereby diminishing the vitality of the air, and whether it did not throw into the air obnoxious gases.

Prof. Chandler answered that before the introduction of the washing process in connection with the supplementary purification, the gases as they escaped into the atmosphere had a disagreeable odor, but the effect of the washing process he thought pretty effectually obviated this difficulty.

Dr. Stone, in speaking of the effects of carbonic oxide in taking the place of oxygen in the blood, stated that one-half per cent. produced poisonous symptoms, and more than one per cent. was fatal to animals.

Resolved, That the hearing in the case of the Metropolitan Gaslight Company be postponed to March 22, at 3 o'clock, P. M., the Company stipulating in the meantime to introduce and test in half their purifiers the iron process, in use by the New York Gas Company, or some other process to be approved by Prof. Chandler,

Betous Agglomeres or Artificial Stones.

[*Written for this Journal.*]

Considerable attention has of late been drawn to the subject of artificial stones, both in this country and abroad; and the more we advance in civilization, the more we feel the want of a building material uniting to the imperishable character of good stone the property of being readily moulded or shaped into the elaborate and ornamental style of structures demanded by our increasing taste for the beautiful.

The partial failure of the patent building blocks, exhibited by the accidents of this winter, at Washington and Morrisania, although throwing cold water upon the subject in the public mind, has awakened the inquiry into the cause of these failures, and intelligent builders and architects are sure to profit by the lesson.

The building block referred to are made of lime and sand, properly tempered with water, and compressed in moulds; and the theory is, that as the carbonic acid contained in the atmosphere is absorbed by these blocks, the conversion of the lime into a carbonate of lime, will harden the block and make it solid. So far the theory is correct, and were we materially certain that each grain of sand in the block is perfectly coated with lime, and that each grain of sand so coated was brought in close proximity to its neighbor grains of sand, so as to present no air cells whatever; could we depend further upon the carbonic acid gas being brought to react on the block in sufficient quantity and under proper circumstances, we would undoubtedly obtain a good block by this process. But in practice this is not the case—the lime does not perfectly envelope each grain of sand; it is next to impossibility to obtain by compression in a mould the degree of compactness alluded to; and, finally, how many disturbing circumstances may we not enumerate which do prevent the prompt action of carbonic acid on these blocks. No wonder then that we have witnessed these failures, and that the opinion of all respectable builders and architects is adverse to the use of *such* artificial stones.

Can we say the same of all artificial stones? Certainly not. We have seen several specimens of artificial stones, which may with advantage, compare with natural ones; and we find that all over Europe not only the artificial stone is coming every day more and more into use, but that of late the largest structures are being made all of one piece of artificial stone; perfect monolith as it were—some of the boldest and most elaborate designs ever made by man.

For interior work, for statuary, and ornamental pieces of stones, oxychlorate of magnesia, silicate of lime or magnesia, ferroginous cementations, and other compositions are now extensively used instead, or combined with, the sulphate of lime process. But for large works, for marine and hydraulic works of engineering, nothing seems to have yet attained the perfection which the system called in France "Bétous Agglomérés," has been brought to.

We have in our possession a piece of this artificial stone, broken from a common window sill, and can safely say that if this is the material produced by the process, it is no wonder that we hear so much of the rapid success which attend it in Europe.

With such dense and impervious stone, susceptible of being shaped at will by the architect like the clay, under the thumb of the artist, into any work of art; when he can as easily obtain a bridge, a house, a wharf, a pier, or a cathedral, all of one piece, and at a reduced expense. We can understand how this extraordinary invention is occupying the minds of European engineers.

No wonder that we hear of its being adopted for government works of the greatest magnitude, and that it is spreading all over Europe with much rapidity. Could anything more beautiful be found for the construction of aqueducts than that material—enabling the engineer to make a single pipe of any length desired. Witness the one being now constructed for the Paris Water Works, and which will be several miles in length, without any joints.

Already the gas engineers of Europe have availed themselves of this new material in the construction of their gasholder tanks, several large ones of which have already been built, all of one solid stone, with perfect success.

For sewers or tunnelling it has no equal, while for foundations of buildings in damp places, it is now received as far superior to any mode of construction.

It was only when iron was run into shape by casting that that "King of the Age" began to acquire its vast importance. What may we not expect of an invention which now enables the engineer to mould, likewise a perfect stone of any magnitude into any shape he may have conceived in his brain.

There is a general impression that an artificial stone is less dense, less enduring, and stronger than natural ones. This in this case is a grave mistake, for the manufacturer has it in his power to obtain a grain or texture of any kind, and to maintain or vary this texture throughout the whole body of his stone, whatever may be its size; and we may readily understand that by this method a stone may be obtained more enduring, more compact, and more regular of texture even than our splendid brown sandstone

In all those States where building stone is rare, and where sand can be obtained readily, this mode of building will certainly be a great acquisition; and we hope to see it soon introduced in our country, so as to judge by ourselves of its reported merits.

The New York Society of Practical Engineering.

[*Reported Expressly for this Journal.*]

The regular fortnightly meeting of this society took place on Tuesday evening, March 30th, at Room 24, Cooper Institute. President James A. Whitney, in the chair; W. B. Harrison, Recording Secretary.

The subject for the evening discussion was "Irrigation, its past, present and future" and a paper prepared by the president was read by him during the meeting, Dr. A. W. Hall presiding pro. tem.

The author introduced the subject by a discussion of the relation borne by water to living things, and of the necessary existence of such relation to the continuance of life. Viewing irrigation through the light of history and its practice in Egypt, Babylon, and in Palestine, it was shown to be an art existing at a very ancient date. The subject of irrigation was classified by the writer into four classes, more especially with reference to the manner in which the water is applied to the portions of ground to be irrigated. The first mode is that of flooding. In this mode the land is flooded with water containing organic matter in suspension.

The second mode was that of flowing. In this mode, the water is allowed to flow through canals or other aqueducts over the fields. The third mode was that of subterraneous irrigation, the water in this system being allowed to percolate the soil without necessarily reaching the surface.

The fourth was that of artesian wells. The quality of water best adapted to irrigating purposes was also discussed. Irrigation as practiced at the present time in the different countries of the Eastern Continent was next taken up by the author. On account of the magnitude of the scale upon which the system is practiced as well as the amount of engineering talent expended upon the subject, Italy stands prominent if not foremost, there being in the provinces of Lombardy and Piedmont alone over one and a half million acres of land watered by artificial irrigation. The government canals of Lombardy measure 133 miles in length, and the Mantua and Verona are said to have a combined length of over thirty-five hundred miles, and the quantity of water thus utilized is 24,000 cubic feet per second. In bringing this canal and irrigating system to its present state of perfection a school of hydraulic engineers has been established. The education of this class of engineers is attended to with care, and an apprenticeship of four years served under an established engineer is necessary before a candidate for the profession will be allowed to practice. In conclusion the author referred to irrigation as carried on in the far West, making mention of California as much in need of that system of hydraulic works practiced in other countries, although having to some extent applied a system of irrigation in some parts of the country. Colorado was represented as containing millions of acres almost valueless for want of a system of canals leading from the Colorado river for irrigating purposes. Utah also for the greater part is in need of the same, though the Mormons have to some extent applied the system.

After the reading of the paper, a short discussion ensued in which pertinent remarks were made by members of the society, after which the meeting adjourned.

Preventative of the Decay of Wood.—Experiments have been carried on in Paris for a long time, in the intent of finding out a means of preserving palings, posts, etc., from decay. As the result of a five years' experience, a paint is recommended, which at the same time possesses the advantage of being impervious to water. It is composed of fifty parts of tar, forty parts of finely-crushed chalk, five hundred parts of fine, white, hard sand, four parts linseed oil, one part of the red oxide of copper, in its native state, and, finally, one part of sulphuric acid. In order to manufactnre the paint from this multiplicity of materials, the tar, chalk, sand, and oil are first heated in an iron kettle; the oxide and sulphuric acid are then added with a good deal of precaution. The mass is then very carefully mixed. It is now ready for use, and must be applied while hot. In coating the timber a stiff brush is used. If it is found upon using that the Mixture is not liquid enough, a little more linseed oil should be used. After this paint has cooled and dried, it forms a coating or varnish quite as hard as stone.

Kerosene.

THE INVESTIGAEION BY THE FIRE COMMISSIONERS—A LARGE AMOUNT OF HIGHLY COMBUSTIBLE OIL IN THE MARKET.

The Board of Metropolitan Fire Commissioners have, in consequence of the numerous complaints made, and accidents arising from the use of kerosene oil of inferior and highly explosive qualities, been for some time investigating the subject, under the provisions of the law of 1866, referring to the storage of combustibles within the limits of the Metropolitan district. They obtained three hundred samples from various dealers in this city, and placed them in the hands of Mr. G. Tagliabue to be tested upon scientific principles with the apparatus known as the pyrometer. These showed the fact that the mass of samples submitted were of a terribly inflamable nature, scarcely anything else, indeed, than naphtha or benzine. It is to be wondered at, in view of these facts, that in those sections of the city in which the use of kerosene prevails there stands an unburned house. It was discovered during the investigation that of the three hundred samples submitted only four reached the full standard of non-explosiveness required by law. About a dozen almost reached the proper degree, and all of the remainder were far below the required scale. The Board should now find on whom rests the responsibility for these sales. There is no doubt that the retail dealers are often deceived by the wholesale refiners. In many cases the smaller dealers buy solely upon the representations of the refiners. That these are always strictly honest is not, of course, the case. Nor do they escape deception sometimes even when they demand the application of a test. In making these tests before their customers the refiners mostly use an open cup, as Mr. Tagliabue used in conducting his investigation. The testing apparatus is set in motion and the vapor emitted by the warming oil begins to rise from its surface. There being nothing to protect it against the draughts of air floating about it is more than liable to be wafted away by them. To insure its dissipation the seller often, placing his head near the cup, blows it away with the breath which he uses ostensibly for the purpose of conversing with his patron while professedly watching the rise of the thermometer in the testing cup. It is not consequently until the vapor arises from the body of the oil in a heavy unremitted stream that its ignition ensues upon the application of the match. The vaporizing point is by this device frequently placed from ten to twenty degrees above its actual spot. These facts have for some time been in possession of the police authorities, and yet we have heard of the commencement of no prosecutions against any of the delinquents they point out, whose prosecution the law, as well as humanity and justice, demand. One effectual way of stopping the traffic in these dangerous burning fluids is to pass a law vesting in the Fire Commissioners authority to test the oils sold by all dealers, and to grant certificates to those whose oils successfully respond to the proper test.—*N. Y. Herald, March* 25.

Important Discoveries in Louisiana.

The following article from the New Orleans *Times* speaks for itself, and in the main confirms what we have heretofore published on this subject. It has long been supposed that the State of Louisiana is but an alluvial deposit. The truth, however, may be inferred from the vast deposits of rock salt, and the present discovery of sulphur. The value of this discovery of sulphur in the United States will be readily appreciated by those who deal largely in it. Mr. A. Cochran, a heavy importer from the Mediterranean, and well-known to the merchants of New York and the other large cities throughout the country, pronounces the sulphur of this State purer than any he has ever brought to the port of New Orleans. Mr. Cochran is a wealthy and successful merchant of 30 years' standing is a native, and now a citizen of Boston, Mass. He has just sold an invoice of one hundred tons of sulphur, at $67 per ton. Mr. Cochran and J. E. Wallace, of New Orleans, own the principal portion of the lands where this sulphur has been discovered, and which they purchased for mining purposes some years since: and although they are not connected with any oil company, it must be admitted that their interest in the present developments is sufficient to warrant a due allowance for their statements, however careful we may be not to mislead the public. We are aware that few geologists in the country have heretofore agreed with us as to the mineral wealth of Louisiana, and we doubt not that many will even yet hesitate. Practical men, however, are now, it seems, probing the bowels of the earth in this section, and we may look for new developments of material interest.

Since this article was written we are in receipt of

intelligence from New Orleans, dated Feb. 15, stating that at the depth of 602 feet a vein of petroleum was reached which they are proceeding to pump, believing it is in quantities sufficient to pay.

A VALUABLE DISCOVERY.

A discovery has just been made in Calcasieu parish, near Lake Charles, which is destined to open a more vast wealth to our State, and which plainly demonstrates that our lands are rich in other products of commercial value besides those resulting from agriculture. For a year and a half past the Louisiana Petroleum and Oil Company have been boring in that locality A few weeks ago a depth of 333 feet was reached when the drill struck gray limestone rock having a sub-stratum partially decomposed; passing through this to the depth of 442 feet, a two foot vein of sulphur was reached, almost entirely pure; through this the drill dropped one foot, when the well commenced flowing an inky black fluid of pungent odor. After this was exhausted, boring was resumed and continued for ninety feet through crude sulphur, or a mixture of pure sulphur and gray lime, with occasional stratums varying from two to nine feet in thickness of the pure article. At the last accounts a total depth of 600 feet had been reached, and the boring still continued. Some idea of the value of this discovery may be afforded by the fact that crude sulphur is worth $67 per ton in our market, and although the original project of oil boring is still being prosecuted, steps will soon be taken to work the sulphur mines. The only cause militating against its availability, is the great depth at which it has been found, but the resources of science are sufficient to overcome these difficulties, with the necessary outlay of labor and capital. When we look around among our sister States and view the prosperity accruing to them from the development of their mines, we can view with proper importance the magnitude of this discovery. We have long felt assured that a country so rich and fertile as our own upon the surface, must share to some extent the internal wealth found in neighboring States, at only a few miles distant, and are, therefore, much more gratified than astonished at the discovery of the sulphur mines of Calcasieu. We trust soon to hesr more detailed particulars in regard to an enterprise which unlocks the secrets of earth, and brings its treasures to the surface, as a contribution toward man's prosperity.

Foreign and Domestic Gas Items.

Obituary.—The English papers announce the death of Mr. George Lowe, F.R.S., the eminent gas engineer, who died on Christmas Day at his residence at Finchley. He was elected an Associate of the Institution of Civil Engineers in 1823, transferred to the class of members in 1829, and for some years was a most useful member of the Council. His name is connected with many improvements in gas engineering, the most prominent being his system of reciprocating retorts, and his motive-power meter.

Deave's Petroleum Gas Works.—We observe, in the Alliance, Ill., *Monitor*, a very flattering article, complimentary to Mr. C. E. Gray, president of the New York Gas Works Building Company, who has just erected a petroleum gas works at that place under the Deave patent. The board of directors of the Alliance Gas Company also passed a resolution complimentary to Mr. Gray, for his courtesy, energy and promptness in completing their works in so satisfactory a manner. We understand works on this plan are being erected in numerous places in the West and elsewhere by Mr. C. E. Gray, and give uniform satisfaction. Small towns that do not care to encounter the expense of introducing coal gas works have in this a good substitute.

The City of Louisville and the Gas Company.—We learn that the city of Louisville, Ky., have refused to purchase the gas works; and that the Louisville Gas-Light Company, Dr. J. Lawrence Smith, Pres., have a new charter, extending twenty years. This is as it should be. The city authorities were wise and sensible not to go into a business they know nothing about, but leave it to those who have already mastered the secrets of the art, and who are most likely to make it pay themselves, while giving satisfaction to the public by ignoring politics and taking advantage of such improvements as science and experience may develop for their mutual benefit

Intensification of Gas-Light.—Mr. Jas. Allison Hogg, gas engineer, Edinburgh, practices a method of producing intense light with coal gas. An English paper says of it: "A mixture of gas with atmospheric air is lighted after passing through a tissue of iridio-platinum wires at a determinal pressure. In a few seconds the metal becomes heated up to a white heat, the flame disappears, and an intense white light is the result. An enlarged picture has been taken by its aid on prepared photographic paper. The light will burn in a gale of wind, it is said, without any protection around it, and a downpour of rain will not affect it." The use of platinum to increase the intensity of gas light has been long known, but this seems to be an improvement.

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—Eds.]

Obstruction in Stand Pipe.

Bridgeton, N. J., April 8, 1869.

Messrs. Editors: I suppose your ear is opened to the complaints of all who are in any way connected with the manufacture of gas, whether great or small. As I have been a subscriber to your valuable Journal from the issuing of the first number to the present day, without ever having troubled any one upon any subject, I now take the liberty of asking the cause and the remedy for the obstruction of stand pipe. I have watched somewhat closely for the last twelve years the manufacture of gas in a small way, and during that time have never but once had any serious difficulty, and then it only lasted about a week, and I was utterly at a loss to know the cause or the remedy, as we made use of only the ordinary means of running a scraper up the stand pipe at every charge.

I have now a bench of three clay retorts, which has been in use about six months, and working the whole time very satisfactory until about six weeks since, when the middle stand pipe became obstructed, and still continues to be, notwithstanding every means has been resorted to that I can conceive of, or devise, to keep it clear. I have twice had the dip pipe removed from the main, thinking there must be some obstruction there, but could find none. I have twice had the whole pipe thoroughly burnt out and scraped clean, and in a few days the passage of the gas would be stopped, so that we would be obliged to remove the lid of the retort; and I begin to fear we shall be compelled to dispense with the retort altogether.

If you or any of your correspondents can explain the cause, or suggest a remedy you will confer a great favor on a small gas company.

Yours respectfully,
N. D. Woodruff, Pres't.

[We are sure some of our readers who have encountered similar obstacles will be able to help the writer of the above out of his difficulty, and will therefore defer any suggestions of our own to that end—knowing that practical experience is much more reliable than theory. —Eds.]

Report of Madison Gas-Ltght Company.

Madison, Ind., March 12, 1869.

Messrs. Editors: Since noticing your request for reports from gas companies, this is the first opportunity that I have had to reply, and will do so briefly:

Name, Madison Gas-Light Co.; location, Madison, Ind.; capital, $75,000; shares of stock, $25; dis. 3 per cent.; payable, January and July; number of consumers, 300; price to consumers, $4; public lamps, 105; price to public lamps, $2.50 per 1000 feet; miles of main, 6; size, 6, 4, 3, 2; retorts, clay and iron; holders, 60 x 20 feet—intend to replace an old one 50 x 16 with one 50 x 20. Coal carburetted, 1,490,370 lbs.; production, 5,702,400 feet, or nearly 3 4-5th ft. per lb.; we generally get 4¼ feet. The falling off was caused by low heats on old benches and chokes in underground flues in December last. Number of charges, 8,107; average weight of charges, 184 lbs. nearly. President, Joseph Todd; secretary, James Siddall; treasurer, N. Powell.

During the past year, 1868, we have built 2 benches of fives clay retorts (manufactured by James Holmes, Covington, Ky). They are an excellent article; two new washers (by Stacey & Co., of Cincinnati, Ohio); they cannot be beaten; enlarged our main from 4 to 6 inch from retorts to the purifyers; will replace them (the purifyers) soon with others with six-inch openings; will replace old center seal with a dry one. We will then have as nice a little works as you can find in the West. If you don't think so come and see us next fall. Yours, Jos. Todd, Pres't.

[We publish this because of its completeness. It tells a great deal in a short space, and gives the details in an intelligent manner. We hope others who have forgotten us will go and do likewise, and by and by we will compare notes and give the results for the benefit of all concerned.—Eds.]

"Smedberg's Synopsis of British Gas-Lighting."

San Francisco, Cal., March 22, 1869.

M. L. Callender,
Proprietor Am. Gas-Light Journal,
No. 22 Pine street, New York.

Dear Sir: Please push the subscription list of my "Synopsis of British Gas-Lighting" as fast as possible. It would have been in the hands of the printer long since but for the indifference with which four hundred gas companies have treated its prospectus. As the case stands, I feel it due to those who have honored me with their subscription to state, that the preparation of the work is well advanced, and that the delay which has occurred must not be construed into an abandonment of the scheme. I shall send you the manuscript of another section of the "Practical Management of Gas Works," within a week or ten days.

Yours faithfully,
James R. Smedberg.

Answer to "A Problem to be Solved."

Yonkers, April 7, 1869.

Messrs. Editors: In answer to your article headed, "A Problem to be Solved," in your issue of 2nd inst., I would say if "Machinest" will examine the divisions of his center seal, between the inlet to first pan, and outlet to holder, I have no doubt he will find the cause of the whole of his trouble. Some of the gas passes direct from the retorts to the holder, without going through the lime at all. If he will take the center seal out, turn it upside down, and fill each division with water, he will soon solve the problem himself.

Respectfully,
James Slade, Sup't.

[Will be obliged if "Machinest" will communicate the result of the remedy recommended above.—Eds.]

Evaporating Water in Connection with Stoves and Furnaces.

The *Boston Journal of Chemistry* says a correspondent inquires, "What becomes of all the water evaporated in the hot-air chamber of furnaces? Several pailfuls are evaporated in many furnaces each week, and yet the walls and windows of the heated rooms appear dry."

If the sense of sight of the occupants of our dwellings was acute enough, many strange and interesting processes might be observed, which are now entirely hidden from view. What are called "convective currents" would be seen, in heated rooms, moving upwards and downwards, the warm air ascending, the cooler descending. Constant agitation, constant motion, is maintained in all apartments, even those apparently the most quiet. Air in passing in and out of rooms through every crack and crevice, and the amount thus transferred in the course of twenty-four hours is immense. If it were not so, no one could live in-doors a single day. The air passing up from furnaces, loaded with aqueous vapor, is disposed of in various ways. The abnormal moisture is in part condensed by contact with cool surfaces in the room; a part passes out of doors; and still another portion is distributed over the dwelling, and is condensed upon ceilings, floors, windows, etc. In frosty weather, a large part is condensed upon the windows, which are rendered cool from the chilling winds without.

Families suffer in health, and dwellings are injured, by this foolish practice of evaporating water in connection with stoves ard furnaces. No family should allow "several pailfuls" of water to be changed into vapor every week, to hang in the atmosphere of rooms, and impinge upon furniture and walls! A pailful of water makes seventeen hundred and twenty-eight pailfuls of steam. What an atmosphere this must produce for human beings to live in! Is it natural? Is it pleasant? Is it healthful? No. We have always found the most cases of croup, influenza, rheumatism, coughs, etc., in families who entertain the erroneous and vulgar idea that much moisture is essential to health. A better system of ventilation, a more careful adjustment of temperature is what is wanted in our dwellings—not an abnormal steam-impregnated atmosphere.

Hydrogen and its Analogues.

On the 20th of February, Dr. William Odling, F.R.S., delivered another of his course of ten experimental lectures at the Royal Institution, upon "Hydrogen and its Analogues."

On this occasion he gave attention principally to the combinations of hydrogen. He burnt a jet of pure hydrogen in a jar of chloirne gas; the flame increased in brilliancy, and the product of combustion was hydrochloric acid gas. Next he filled an inverted Florence flask with hydrogen, and, after lighting the gas at the mouth of the flask, he lowered it over a jet of chlorine issuing from a fine glass tube; the chlorine was then seen to burn inside the flask of hydrogen. Both the foregoing experiments show the surface nature of chemical action, for all flames are nothing but shells, the luminous layer being where the two gases come into contact; it does not matter which gas forms the jet or which forms the exterior envelope, as in any case the flame will be produced. A jet of hydrogen was next burnt in a large glass jar full of common air, and the union of the hydrogen with oxygen of the air produced water-gas or steam, which was condensed upon the cold sides of the large glass vessel. The same experiment was shown with pure oxygen in the place of common air, which is oxygen diluted with hydrogen.

Dr. Odling afterwards filled a glass globe with a running stream of coal gas, and, by means of a little piece of tube piercing the bottom of the globe, a jet of common air was admitted into the sphere; this jet was then lighted, so that the common air was seen burning in the middle of the atmosphere of coal gas, this being a reversal of the household experiment wherein jets of coal gas are made to burn in common air. As before stated, it does not matter which gas is outside the other, and the slow combination of the two forms a shell of luminous chemical action. If the two gases are well mixed together, and then lighted, combination takes place at once, and they go off with a bang, which is the reason why a large mixture of coal gas with the air of a room may cause an explosion when a light is introduced; no explosion can take place unless the two gases be mixed before they are ignited.

When one volume of hydrogen unites with one volume of chlorine, two volumes of hydrochloric acid gas are produced, so there is no alteration in bulk. But when hydrogen unites with oxygen, steam is first produced and then water; in the latter case there is great alteration in volume, and there is some alteration even in the transformation into steam, for two volumes of hydrogen uniting with one of oxygen produce only two volumes of steam. To show this by experiment, it was necessary that the vessel wherein the two gases united should be kept at such a high temperature that the steam produced could not be condensed into water. This was effected by first mixing two volumes of hydrogen with one of oxygen, in a large tube closed at its upper end, and inverted over mercury.

To maintain the requisite temperature a second and larger tube was inverted over the first; and the space between the two was kept full of the transparent vapor of boiling aniline, for aniline boils at 180 deg. Centigrade—a temperature much higher than that of boiling water. The mixed gases in the inner hot tube were then fired by an electrical spark; they combined with an explosion, after which the mercury instantly rose in the tube, and showed that the transparent steam or water-gas produced occupied only two-thirds of the space which had been taken up by the two gases while uncombined. After showing how hydrogen will decompose vapor of tetrachloride of carbon, under the action of heat, by uniting with the chlorine to form hydrochlorcie acid, the lecturer showed how the ignition of a mixture of hydrogen with nitrous oxide or laughing gas will set up decomposition, resulting in oxide of hydrogen and nitrous gas.

Dr. Odling next took a jar of chlorine gas, and shook up in its interior a little of the most volatile spirit which can be distilled from petroleum. When this mixture of gas and vapor was ignited the hydrogeu united with the chlorine, producing at the same time a deep red light and volumes of black smoke.

Another very neat experiment exhibited by Dr. Odling was the combustion of oxygen and ammonia. Some strong liquid ammonia was placed in the bottom of a glass flask, and a stream of oxygen was directed upon the surface of the liquid by means of a glass tube passing down the neck of the bottle, till it just touched the surface of the ammoniacal solution. Upon dropping a light into the flask the mixed oxygen and ammoniacal gases caught fire, and burnt brilliantly upon the surface of the liquid. Substances rich in hydrogen and carbon, such as wood and tallow, will usually burn vividly in oxygen or common air; but when the exterior gas is highly hydrogenous, the substances easy to burn therein must usually be rich in oxygen. Chlorate of potash, which is very rich in oxygen, is incombustible in common air; but when Dr. Odling made some chlorate of potash red hot in a metal spoon, and immersed it in a glass jar filled with coal gas, the chlorate of potash burnt away brilliantly.

In this summary the best of a very large number of experiments have been described, and the whole of them were expeditiously performed by Dr. Odling in less than one hour, accompanied by very clear explanations of the principles involved.—*London Daily Telegraph.*

Oxy-Sulphide of Carbon.

A gas, bearing the above name, has been recently discovered by Thau. It is composed of one atom of carbon, one atom of oxygen, and one atom of sulphur, and may be regarded as carbonic acid in which one atom of oxygen is replaced by one atom of sulphur. It is formed when not too dilute sulphuric acid acts upon sulpho-cyanide of potassium, and must be freed from hydrocyanic acid, vapor of water, and sulphide of carbon, that are simultaneously produced. The dry gas has an odor suggestive of carbonic acid, somewhat aromatic, and occasionally reminding one of sulphuretted hydrogen. Water absorbs equal volumes of the gas and takes the peculiar aromatic odor. The saturated solution tastes, in the beginning, decidedly sweet, then assumes a prickly sulphur taste, suggestive of sulphuretted hydrogen and sulphurous acid. In a few hours a very decided sulphuretted hydrogen odor is evolved, just as in the sulphur springs containing carbonic acid. The density of the gas is 2.10; it is less sour than carbonic acid; ignites by a glowing taper, and burns with a blue, non-illuminative flame, to carbonic acid and sulphurous acid. Mixed with one and one-half volumes of oxygen, it explodes, but burns quietly when mixed with seven volumes of air. Caustic potash completely absorbs the gas, but more slowly than it does carbonic acid. The solution is inoderous, but evolves carbonic acid and sulphuretted hydrogen with weak acids. The gas precipitates carbonate of lime from lime water, while sulphide of calcium remains in solution. It produces, in basic-acetate of lead, at first, a white precipitate, which soon turns brown; neutral or acid salts of lead, silver and copper, are not at all changed by the gas. Chlorine and fuming nitric acid produce no effect at ordinary temperatures, but the gas is decomposed at a low red heat into sulphur and carbonic oxide.

This newly-discovered gas appears to be widely disseminated in nature, but as it is so easily changed by water into carbonic acid and sulphuretted hydrogen, it frequently escapes detection. It is undoubtedly contained in most mineral springs where carbonic acid and sulphur are present. These mineral waters, fresh from the spring, have no disagreeable odor, but in a few days smell decidedly of sulphuretted hydrogen. Practical applications of the gas remain to be suggested, but it is an important scientific discovery.—*Journal Applied Chemistry.*

That New Gas Lamp

At the corner of the Ross County Bank continues to give a most brilliant and beautiful light, far superior to any other gas lamp we have noticed.

It is the invention of Mr. J. W. Graham, the Superintendent of the Gas Works in this city, who, we understand, claims that this lamp can never freeze in winter; can not choke up with dirt or water in the pipes; that it is cheaper and far more durable, and, on account of the greater purity of the gas, it gives more light and requires less attention—the cleaning of the burners once or twice in a year being sufficient to insure a clear and beautiful light throughout the coldest winters, as well as in summer. This lamp has continued burning through the past winter without the least indications of being affected by frost, while other lamps froze and stopped burning, and required constant care and watching. Mr. Graham has been with the gas company here some eighteen years and his experience and ability well qualify him to devise so complete and perfect a remedy for the many annoying difficulties experienced, and we congratulate him on the success of his invention, which we doubt not will soon become the great favorite with all parties interested in strest gas lighting. The discovery has been patented and will soon be introduced to the public.—*Chillicothe, Ohio, Russ county Register.*

Gas-light on Shipboard.—The lighting of railway carriages with gas is about to be followed up by gas-light in ships. The "Monarch" iron-clad turret ship, prepared for sea in Chatham harbor, is ordered to be fitted up with Gurney's gas apparatus. every portion of the vessel being intended to be lighted by gas, which will be manufactured on board. The estimated expense of fitting up Gurney's apparatus is about fifteen hundred dollars.

Denton on the Origin of Petroleum.

Professor Denton says that petroleum is not a *coal* oil, but a *coral* oil. Among his arguments in support of this theory are the following: It is rarely met with in a coal district. Not even a *smell* of it has Prof. D. perceived in any of the coal mines which he has visited. If it is from coal it should never be found in rocks older than the coal measures. The contrary is true. "In this country nearly all the oil hitherto obtained has been from beds that lie below the coal measures, and sometimes at a great depth below them. On Oil Creek, in Pennsylvania, it is found by boring in shales and sandstones, sometimes to a depth of one thousand feet; these beds belonging to the Chemung group of the Devonian formation, and many hundred feet below the coal measures. At Enniskillen, in Canada West, where the oil has at one time come up in springs, and overflowed, leaving a thick bed of asphaltam covering the ground for an acre, the limestone in which borings are made contains characteristic fossils of the Hamilton group of the Devonian formation. The oil wells in Western Kentucky, and in some parts of Tennessee, are in the Trenton limestone—that is, in the lower Silurian formation. The same oil floats on the surface of a limestone quarry near Chicago, the limestone belonging to the Niagara group of the Silurian formation; showing conclusively that it has no necessary connection with coal."

The immense quantity of free oil forbids the belief that it could have been produced from sea plants. It would require large subterranean lakes of it, to pour out the thousands of barrels which some wells have daily yielded. The sea-weeds of the Silurian and Devonian times contained so little bituminous matter that their impressions do not even darken the light-colored shales in which they are found.

Against the theory that it has been distilled from bituminous shales may be said, that for this strong heat is required; and generally, where it is found in greatest abundance, there is the least appearance of igneous action.

Professor D. has in his possession numerous specimens of fossil coral from Devonian and Silurian rocks, the honeycomb cells of which are filled with this oil. He has seen the same from different parts of the country. We quote a portion of his conclusion: "I have found it repeatedly in these corals, and in no other part of the rock invariably accompanying the corals, and never connected with any other fossil; these corals frequently in the center of limestone blocks. Reefs of such coral would furnish oil in quantities sufficient to account for the immense deposits that have been discovered. Preserved by them in compact bodies, the oil taking up at least half the space of the coral reef, we can readily suppose, that when the cells were crushed by the superincumbent weight of rock, or during upheavals and subsidences, cavities and crevities in the earth's interior would be filled by it. It is, then, an animal production, and not a vegetable one."—*Scientific Press.*

Bessemer's Last.—The recent improvements in the manufacture of refined iron, and of malleable iron and steel, which have been made by Mr. Bessemer, consist in injecting into molten crude iron, or re-melted pig iron, or other carburet of iron, jets of fused nitrate of soda or nitrate of potash, or other fluid substances which are capable of evolving oxygen when brought in contact with fluid iron; such substances being used alone or in conjunction with oxides, peroxides, or silicates of iron or manganese. The jets are projected downward at any angle from tuyeres, the orifices of which are above the level of the fluid iron. The iron to be operated upon may be contained in those vessels known as "converters," generally employed in the Bessemer process, or in a cylindrical chamber lined with fire-brick, or other refractory material, or in the hearth of a "finery furnace," similar to those employed in refining pig iron for puddling.—*Exchange.*

Chlorine Gas for Toughening and Refining Gold.—At a late meeting of the Chemical Society of London, Mr. F. B. Miller read a paper on the application of chlorine gas to the toughening and refining of gold. The process devised by the author consists in passing a stream of chlorine gas through the melted gold covered with borax. In a few hours the whole of the silver present is converted into chloride, which floats on the gold. The borax prevents the loss of silver by absorbation or volatilization. As soon as the gold has become solid the still liquid chloride of silver is poured off, and the gold is now found to have a fineness of 992 parts in 1000; the loss of gold is about the same as in the ordinary process.

Prices of Gas Coals—April 16.

PROVINCIAL.

Duty, $1 25	Coarse. Gold.	Slack. Gold.
Block House	$1 75	$0 75
Gowrie	1 75	0 75
Lingan	1 75	0 75
Sydney	2 13¾	0 71¼
Pictou	2 13¾	1 18¾
Little Glace Bay	1 75	1 00
Caledonia	1 60	0 75

AMERICAN.

	Coarse. Currency.	Slack.
Westmoreland Co.	$8 90	$8 00
Despard Coal Co.	8 50	8 00
Penn	8 90	8 00
Newburgh Orrel Gas.	8 50	8 00
West Fairmount Gas Coal		7 00
Powelton Gas Coal	8 00	7 00

Delivered in New York.

PRICES OF FOREIGN COALS—DUTY $1.25 PER TON.

Liverpool Gas Caking	$ 9 50
" " Cannel	14 00
" House Cannel	18 00@19 00
" " Orrel	16 00@18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverpool House Orrel, scr'd	$16@$18
" " Cannel, scr'd	18@$22

Per ton, 2000 lbs. delivered.

Ruling Prices of Eaglish and American Gas Uoals between 1866 *and* 1369.

English Caking Coal	$9 to $12
English Cannel	10 to 17

Ex ship.

Despard (American) Coal	$8 to 9½
Westmoreland	8 to 9½
Pennsylvania	8 to 9½
Block House (Cape Breton)	8 to 10
Albert Cannel (New Brunswick)	35

Recent American Patents.

87,772.—STEAM GENERATOR.—James G. Hamilton, Chicago, Ill.

87,789.—STEAM ENGINE PISTON PACKING.—Thomas R. Morgan, Pittsburg, Pa.

87,813.—STEAM ENGINE VALVE-GEAR.—Thomas Wosser, San Francisco, Cal.

87,828.—PUMP.—Lewis H. Davis, Newark, Del.

87.888.—STEAM ENGINE OSCILLATING VALVE.—A. Trew, Union City, Ind.

87898.—LAMP-BURNER.—Joseph Bell Alexander, Washington, D. C.

87,912.—PUMP.—George Cowing, assignor to himself, John P. Cowing, Philo Cowing, and Marshall Cowing, Seneca Falls, N. Y.

87,922.—GAS-BURNER.—Conrad Franz, Cincinnati, O.

87,928.—ROTARY STEAM ENGINE.—S. H. Hamilton, Bushnell, Ind.

87,959.—LIQUID METER.—John Minor, Peoria, Milton W. Nesmith and Geo. W. Nesmith, Metamora, Ill.

87,972.—GAS-PLIER.—Herman Richter, New York.

87,982.—RTEAM-GENERATOR GUAGE-COCK.—Jas. Waters, Minneapolis, Minn.

88,001.—WATER-WHEEL.—J. B. Park, Omaha, Neb.

88,069.—WATER-ELEVATOR.—C. D. Palmiter, assignor to himself and Lavinia P. Webb, Oswego, N. Y.

88,079.—APPARATUS FOR GENERATING GAS, AND HEATING DWELLINGS AND OTHER BUILDINGS.—Silas C. Salisbury, New York City.

88,160.—WATER RESERVOIR FOR COOKING STOVES.—C. O. Greene, Troy, N. Y.

88,2.6.—LAMP-SHADE HOLDER.—Joseph T. Pope, New York City.

88,221.—WATER-METER.—Gerard Sickles, Boston, Mass.

Gas and Water Supply Corporations and their Customers.—A case of considerable interest has been heard at the Carlisle County Court. It was an action brought against the Corporation of Carlislie to recover 5*l.* for damage sustained by reason of the defendants cutting off their supply of gas. The Corporation are the proprietors of both the gasworks and the waterworks, and the plaintiffs having fallen into arrears of *water* rate to the extent of 7s. 4d., the defendants cut off their supply of *gas*. The plaintiffs submitted that the defendants had no right to stop the supply of gas for any default in respect of water. The defendants contended that they could cut off the supply of gas at any time. The judge held that they could not. If, he said, they agreed to supply a customer, a contract was implied which could only be invalidated by his breaking their rules and falling into arrears.—Verdict for the plaintiffs for 20s.—*London Builder.*

Utilization of the Sun's Rays.—We mentioned some time ago that the celebrated Ericsson had invented a machine for utilizlng the heat of the sun's rays. It seems now that a Frenchman, named Mouchot, has been experimenting in the same direction. Mr. Louis Figuier, well known for his popular treatises on geology and natural history, has written a communication to a French newspaper, detailing the processes followed by Mr. Mouchot, and averring that the latter has succeeded in actually driving a small steam engine by means of them. A concave reflector is used to concentrate the sunshine on a boiler blackened with smoke, and it is computed that in the latitude of Paris the heat reflected from a surface of a square metre, or a little more than a square yard, will make a quart of water, taken at the freezing point, boil in ten minutes. By the same calculation, an area of one hundred square metres will furnish as much heat in ten hours as can be got by burning sixty pounds of coal. In tropical regions, perhaps, the amount would be still greater. It is evident that we are here on the track of a stupendous improvement in the methods of gaining mechanical power, which, it is to be hoped, may be successfully followed up.

Smedberg's "Synopsis of Gaslighting."

The following subscriptions to the above work is acknowledged, making in all 206 :

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H. H. Fish, Utica Gas Co., N. Y.
W. J. Ball, Terre Haute, Indiana. (221-1yr.

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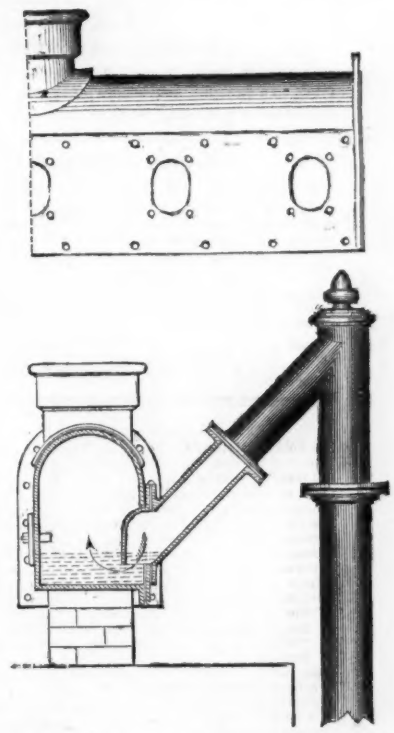

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THE

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AND

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EDITORS AND PROPRIETORS.

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Geologist and General Scientist,
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

FRIDAY, APRIL 16, 1869.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. Newsdealers will please send orders to them.

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NOTICE.

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TO OUR SUBSCRIBERS AND PATRONS.

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Answers to Correspondents.

J. McI., of Ontario—A gas works making 15,000 feet per diem will warrant the employment of an exhauster.

O. H. P., of Mich.—The gas should have a water pressure of from four to six-tenth at the burner, to get the best results. If it is much higher the gas will be unconsumed—that is, will not give the amount of light corresponding to the gas consumed; and if the pressure is lower it will be dim and smoky, because it does not expand into the atmosphere with sufficient force to complete the combustion.

F. S. L., of Iowa.—In order to condense all the exhaust steam of your engine, and use it over again as fuel, allow it to exhaust and condense in a close cold water tank; then conduct it into an open pond, from which it may be taken by the suction pipe of the feed pump.

FACTS ABOUT GAS FOR THE PEOPLE.

OTHER METHODS FOR REGULATING PRESSURE.

Although the pressure of gas varies so generally, as has been stated, owing to a difference in altitude, so that it requires regulating, not only in different localities dependent upon the relative hight of the street mains above the gas works or gas holder from whence the gas is distributed, but also upon the relative hight of the consumer above the street.

Other causes produce a variation in the pressure of gas in the same locality at different times. Every one has observed, that when the gas is first lighted early in the evening, the flame has great force, so as to *blow* as it is commonly termed; that is, the force of the gas as it issues from the burner is so great that it fails to expand in a flat flame, but shoots up in a long irregular flame, producing a whistling or "blowing" sound; while the character of the flame and illumination is anything but agreeable, and requires prompt regulation by partially turning off the gas at the stop-cock. Later in the evening the gas becomes dim, and the stop-cock requires to be turned on full, to give a proper light; and again still later the pressure increases, producing the same phenomenon of "blowing" as first described.

Two conditions produce these results. It may be owing to the partial turning on or off of the gas at the gas works or point of distribution; and it may be caused (which is generally the case) by the change of tension or pressure of the gas in the street mains, owing to the fact that early in the evening there are few consumers; later, all the consumers are being supplied, and this great draught lessens the pressure in the mains. Still later, some of the consumers turn off their gas, the flow in the mains becomes slower and the pressure increases, producing the results previously mentioned.

Of course, the changes in pressure *from hour* to *hour*, increase and decrease the consumption of gas proportionately with the pressure, but the light as previously explained, is not at all proportional to the pressure and the amount of gas consumed; and it may cause a loss of from twenty to eighty per cent, and even more.

As a general rule the pressure is least *from eight to ten P. M.*, and the loss of gas *less during those hours*, and *greater* during the other hours of gas-lighting.

To regulate the pressure most people endeavor to adjust the stop cocks from time to time, or in some cases, turn off or on, at the meter where the service pipe enters from the street. This is a very uncertain and inefficient method. The eye cannot detect the change in pressure except where the change is great. It requires a mechanical appliance or regulator, which will act automatically; and instruments are now much employed with great satisfaction for this purpose.

THE GAS PRESSURE REGULATOR.

This instrument is so arranged as to automatically open or close a valve, which gives passage to the gas. The pressure of the gas acts upon an inverted cup or vessel, which floats in mercury, water or glycerine, causing it to rise or fall as the pressure varies. This is attached to and operates the valve, which gives passage to the gas that supplies the burners.

Another kind of Regulator is a simple chamber or vessel, with a thin elastic diaphragm of leather, oiled silk, or even thin metal, which is easily moved by the gas pressure, and serves to close or open a valve attached or suspended thereto.

These instruments are generally placed near the meter; but in buildings of several stories, each story requires a regulator, owing to the increased pressure as gas ascends, as previously explained.

The little regulator previously mentioned, which attaches to the burner, is valuable on this account, and is the only kind that can be employed in street lamps. The large Gas Regulators most in use are the Cresson regulator, Wood regulator, Wheeler & Wilson regulator, the Leffingwell regulator and Begg's regulator, which take their names from the inventors or manufacturers.

Every consumer should have a cheap pressure guage attached to his service pipe, that he may know at a glance whether he is using gas at a proper pressure.

We close this part of the subject by the following exhibit of a table, showing the difference in consumption of different burners at different degrees of pressure.

As a rule, it may be stated, that the consumption of gas increases fifty per cent. where the pressure is doubled or increased one hundred per cent.

BURNER.	Pressure in inches of water.	Consumption per hour, in cubic feet.
Single jet,	0.30	2.6
Single jet,	0.50	3.9
Single jet,	1.20	5.2
Small fish-tail,	0.34	1.4
Small fish-tail,	0.77	2.2
Large fish-tail,	0.48	2.3
Large fish-tail,	0.97	3.3
Large bat's-wing,	0.70	3.1
Large bat's-wing,	1.40	4.5

THE NEWBURGH ORREL COAL CO.

These mines are located at Newburgh, Preston county, West Virginia, and have gained a high reputation for supplying an excellent quality of coal for gas purposes. By analyses it is found to yield 10,896 cubic feet of gas to the ton of 2440 lbs. of good illuminating power, and remarkable freedom from the impurities generally found in coal gas; one bushel of lime purifying 6792 cubic feet of gas, with a large amount of coke of good quality.

This coal has a well established reputation, having been used for many years very extensively in various companies in the United States, among which are the Manhattan, Metropolitan and New York gas companies, of New York; the Citizens Gas Co., of Brooklyn, New York; the Baltimore Gas Co., and Providence Gas Co., R. I., etc.

This coal is said to be almost absolutely free from sulphur. In the report of the Inspector of Gas of the Baltimore Gas Co.'s gas, when this coal was used, the amount of sulphur only ranged from 2:5 grains to 3:75 grains to the 100 cubic feet.

The company's office is No. 52, South Gay street, Baltimore. C. Oliver O'Donnell, President; S. W. Mahool, Secretary.

Charles W. Hays is agent in New York city; office, Trinity Buildings, 111 Broadway, Room 7.

PURIFICATION OF LIGHTING GAS AND BURSTING OF WATER PIPES.

The interesting papers upon these subjects, published in our last number—the first written by Prof. H. Dussauce, the latter by Prof. P. H. Van der Weyde, M. D., have elicited much commendation from our readers, for the interesting and valuable information given upon these important subjects. The tables of figures furnish data both new and valuable.

Professor Van der Weyde has handed in an article embodying a "Table of the Principal Properties of the Products of the Distillation of Petroleum," which is too late for this number. It will appear in our next issue, and will embody information entirely new upon this subject, the result of the doctor's private experiments.

MESSRS. HOY, KENNEDY & CO.

These gentlemen, so long and favorably known to the gas public as contractors and builders of gas works, railroads and railroad supplies, have lately commenced the manufacturing of gas works castings, materials and all kinds of gas apparatus. Their works are at New Castle, Delaware, where they propose to meet every demand in their line.

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Mr. John P. Kennedy built the Metropolitan Gas Works of this city, and may be considered decidedly a progressive man in gas matters.

The advertisement of Hoy, Kennedy & Co. will be found on page 298.

"SMEDBERG'S SYNOPSIS OF BRITISH GAS-LIGHTING."

Under the head of "Correspondence" will be found a letter from Mr. J. R. Smedberg, which will fully explain itself.

Inasmuch as our readers are assured of the desire and determination of Mr. Smedberg to carry out his original intention, we trust all who wish to subscribe will now make manifest by letter, their desire to obtain a copy of a work so valuable as this must certainly be to all gas men.

As the copy is being sent on for the printer, it cannot be long before it will be ready to deliver. Our part will be done with despatch.

The above, and the letter referred to, we hope will answer the numerous enquiries upon this subject.

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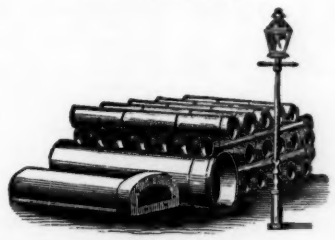

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L. F. Mellen & Co., Agents, Cleveland, O.

Refer to following consumers:—Buffalo Gas Company, Detroit Gas Company, Peoples Gas Company, Chicago, Fort Wayne Gas-Light Company, Brooklyn Gas Company, Jersey City Gas-Light Company, Cleveland Gas-Light Company.

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FIG. 1.

Fig. 1 shows a single gate valve.

Fig. 2 represents wedge and one-half of gate.

Fig. 3, a section through body, gate and wedge, intended for larger sizes of water valves required to bear heavy pressure either side.

The slides, G G, are held against wedge D, by ribs, H H, projecting from sides of valve body, A.

In closing the valves, when opening I is covered, slides, G G, pass the lower ends of ribs, H H, when the wedge, D, can move forward on the inclined planes E E, and crowd the gates apart.

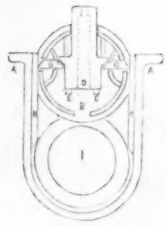

FIG. 3.

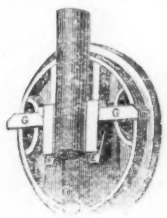

FIG. 2.

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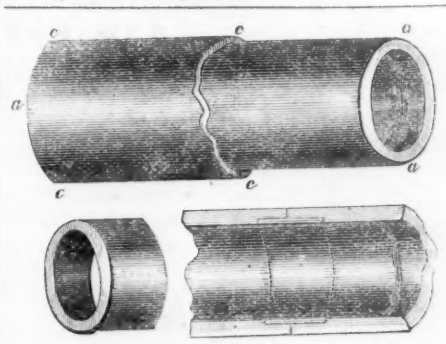

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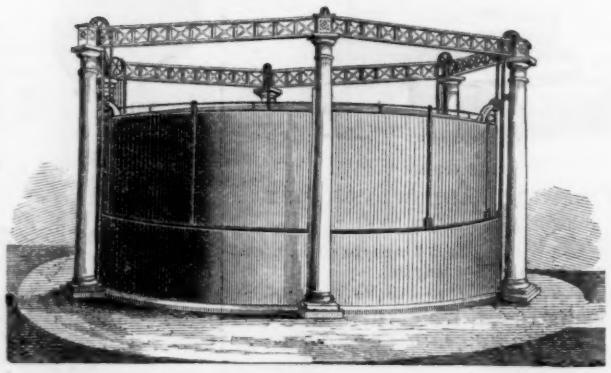

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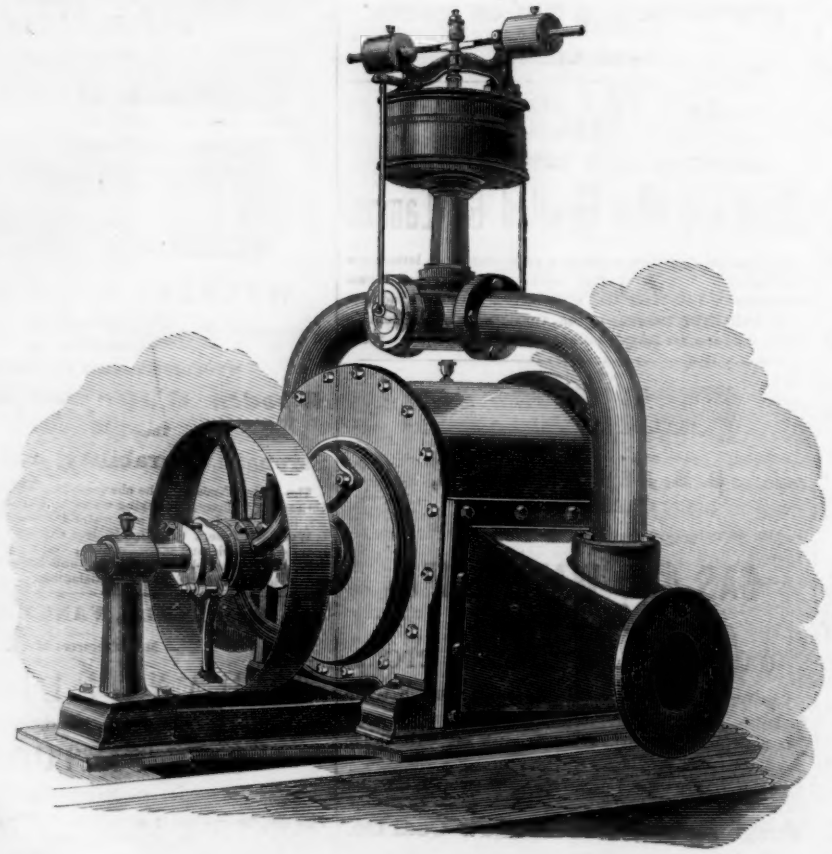

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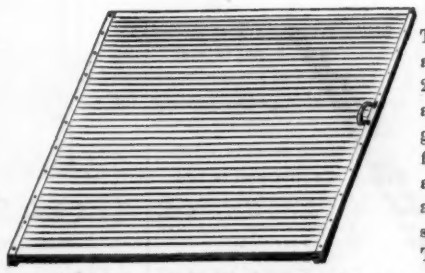

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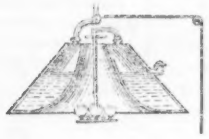

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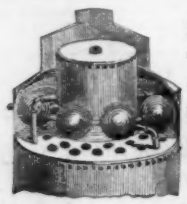

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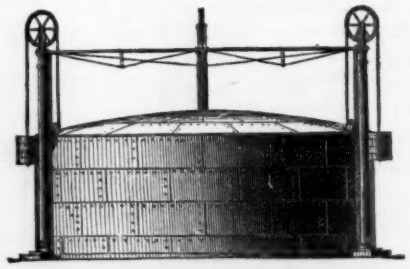

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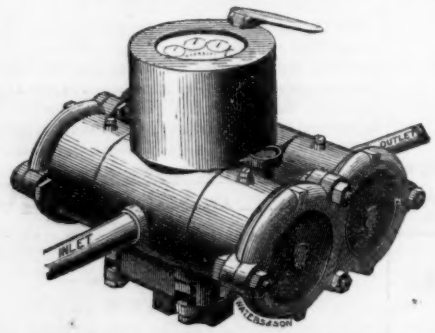

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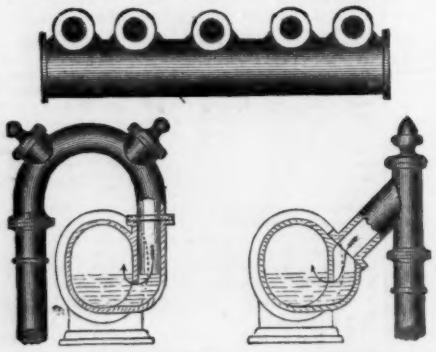

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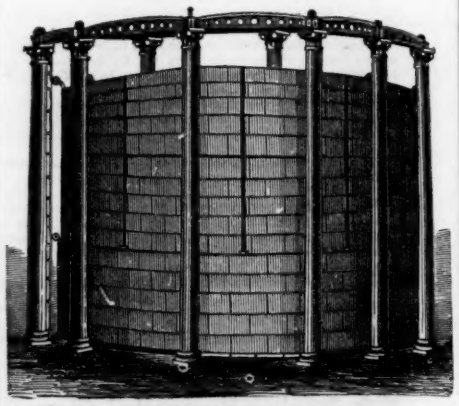

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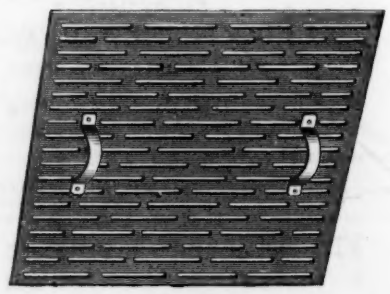

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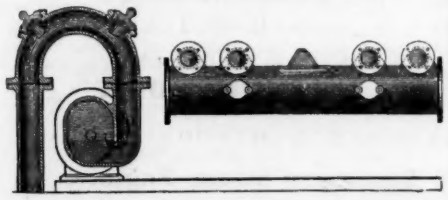

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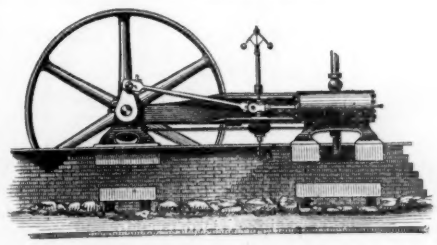

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